

NON-PUBLIC?: N  
ACCESSION #: 9509190007  
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Beaver Valley Power Station Unit 2 PAGE: 1 OF 3

DOCKET NUMBER: 05000412

TITLE: Reactor Trip Due to Main Generator Loss of Field  
EVENT DATE: 8/13/95 LER #: 95-006-00 REPORT DATE: 9/12/95

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR  
SECTION:  
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:  
NAME: L.R. Freeland, General Manager TELEPHONE: (412) 643-1258  
Nuclear Operations

COMPONENT FAILURE DESCRIPTION:  
CAUSE: X SYSTEM: TL COMPONENT: EXC MANUFACTURER: W120  
REPORTABLE NPRDS: N

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On 8/13/95, with Beaver Valley Unit 2 operating at 100%, a main generator loss of field resulted in a generator/turbine trip and a resulting reactor trip. The unit was at steady state conditions with all safety systems available and in automatic. At 1033 hours, a center tap clamp for one of the exciter field current limiting resistors was causing intermittent contact with ground due to vibration from the exciter. This resulted in a Zone 2 loss of field condition and immediately tripped the generator and turbine. The turbine trip initiated a reactor trip. Both reactor trip breakers opened and all control rods fully inserted. Plant response was as expected for a full power trip. All auxiliary feedwater pumps automatically started as designed on low-low steam generator water level. No primary or secondary relief or safety valves lifted, and the main condenser remained available as a heat sink. Both emergency busses remained energized by offsite power. Operators immediately entered

Emergency Operating Procedure E-0, Reactor Trip or Safety Injection. The operators transitioned to procedure ES-0.1, Reactor Trip Response at 1034 hours to stabilize the unit in Hot Standby (Operational Mode 3). Following equipment repairs, the reactor was taken critical on 8/14/95 at 1334 hours, and the generator was synchronized to system at 0114 hours on 8/15/95.

END OF ABSTRACT

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#### DESCRIPTION OF EVENT

On August 13, 1995, with Beaver Valley Unit 2 at 100% power, an exciter loss of field resulted in a generator/turbine trip and a subsequent reactor trip. The unit was operating at steady state conditions with all safety systems available and in automatic. At 1033 hours, a center tap clamp for one of the exciter field current limiting resistors was causing intermittent contact with ground due to vibration from the exciter. This resulted in a Zone 2 loss of field condition and immediately tripped the generator. The generator trip opened the exciter circuit breaker and both generator output breakers. A 4 kV fast bus transfer to offsite power was not necessary as the 4 kV supplies were supplied from the System Station Service Transformers prior to the event. The turbine trip initiated the reactor trip.

Both reactor trip breakers opened and all shutdown and control bank rods fully inserted to shutdown the reactor. Plant response was as expected for a full power reactor trip. The steam driven and both motor driven auxiliary feedwater pumps automatically started as designed on low-low steam generator water level. A partial feedwater isolation properly closed all three main feedwater regulating valves. No primary or secondary relief or safety valves lifted as a result of the trip, and the main condenser remained available as a heat sink. Both emergency busses remained energized by offsite power throughout the transient.

The control room operators immediately entered Emergency Operating Procedure E-0, Reactor Trip or Safety Injection. Following verification of the immediate action steps, the operators transitioned to Emergency Operating Procedure ES-0.1, Reactor Trip Response, at 1034 hours to stabilize the unit in Hot Standby (Operational Mode 3).

There were three minor equipment problems that developed following the trip. A steam generator pressure transmitter, 2MSS\*PT484, Loop B channel 2, exhibited a slow response to the steam generator pressure change. The other two pressure channels for the loop responded properly. After

auxiliary feedwater was secured, a flow control valve to the B steam generator, 2FWE\*HCV100C, would not reopen after it was closed to control steam generator level and reactor coolant cooldown. The redundant train valve to the steam generator was fully operable. The appropriate Technical Specification actions were taken for both items, and the components were returned to service before the reactor was restarted.

The atmospheric steam release valve for the C steam generator, 2SVS\*PCV101C, would not reclose after it was opened pressure control during testing of the main steam isolation valves during the next shift. Operators immediately isolated valve locally. The valve remained isolated for several days for troubleshooting. The valve was later tested satisfactory returned to service.

The reactor was taken critical on August 14, 1995, at 1334 hours, and the generator was synchronized to system at 0114 hours on August 15, 1995.

#### CAUSE OF THE EVENT

The center tap clamp for one of the exciter field current limiting resistors was found to be making intermittent contact ground due to vibrations from the exciter. The momentary contacts with ground caused the exciter field to ground thus causing a degradation of the exciter field. This single ground should not have caused a trip, since the field is isolated from ground. A second ground in the excitation circuit had to be present in the excitation circuit causing the field voltage degrade long enough for the Zone 2 protection to actuate. Extensive testing was performed to locate the second ground path. The second ground was not found in the permanent magnet generator or exciter as evidence from the satisfactory megger results. A second ground could have occurred from foreign material and moisture from the high humidity conditions were present in the turbine building. The presence of this ground may have burned clear during this event.

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#### REPORTABILITY

Beaver Valley Unit 2 reported the reactor trip to the Nuclear Regulatory Commission at 1058 hours on August 13, 1995, in accordance with 10 CFR 50.72.b.2.ii, as an event involving the actuation of the reactor protection system and engineered safety feature system. This written report is submitted in accordance with 10 CFR 50.73.a.2.iv, as an event that resulted in an automatic actuation of an engineered safety feature system, including the reactor protection system.

## SAFETY IMPLICATIONS

There were minimal safety implications as a result of this event. The reactor protection system actuated as designed to properly shutdown the reactor and stabilize the unit in Hot Standby. Engineered Safety Feature systems actuated as required upon receipt of initiation signals.

This event is bounded by Updated Final Safety Analysis Report section 15.2.3, Turbine Trip.

## CORRECTIVE ACTIONS

- 1). Extensive testing of the voltage regulator was performed. The voltage regulator power drawers, power supplies, power amplifiers, pulse generator modules, pulse transformers, blown fuse and loss of pulse detectors, forcing alarm and overexcitation circuits and alarms were inspected and tested with no anomalies or deficiencies found that would have tripped the generator. The exciter field and permanent magnet generator were bridged and meggered with no abnormalities found.
- 2). During an exciter housing inspection, the center tap clamp for one of the exciter field current limiting resistors was observed to have rotated out of normal alignment and was making intermittent contact with ground, as evidenced by wear marks. Since the center tap clamp is not used in the Beaver Valley application, the clamps were removed from Unit 2.
- 3). A post trip review was performed to verify proper unit response. No deficiencies other than those previously discussed were found.
- 4). The voltage regulator at Unit 1 was inspected during a recent maintenance outage. The current limiting resistors were satisfactory, and the center tap clamps were removed.

## PREVIOUS SIMILAR EVENTS

There have been no previous similar events at Beaver Valley Unit 2 involving a reactor trip due to a loss of field.

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September 12, 1995  
ND3MNO:3711

Beaver Valley Power Station, Unit No. 2  
Docket No. 50-412, Licensee No. NPF-73  
LER 95-006-00

United States Nuclear Regulatory Commission  
Document Control Desk  
Washington, DC 20555

In accordance with Appendix A, Beaver Valley Technical  
Specifications, the following Intense: Event Report is submitted:

LER 95-006-00, 10 CFR 50.73.a.2.iv,, "Reactor Trip Due To Main  
Generator Loss of Field".

L. R. Freeland  
General Manager  
Nuclear Operations

JHK/jcd

Attachment

The Nuclear Professionals

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